IEEE P802.11
Wireless LANs

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| PDT MAC High Priority EDCAs |
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Abstract

This document contains Proposed Draft Text (PDT) for the Channel Access – High Priority EDCA feature of the proposed TGbn (UHR, Ultra High Reliability) amendment to the 802.11 standard.

This version of PDT includes the motions passed in IEEE up to November 2024.

# Revision information

The following is a summary of the important changes that occurred within each revision of this document:

|  |  |
| --- | --- |
| **Revision** | **Major changes** |
| 0 | Initial revision: motion passed in IEEE November 2024 |
| 1 | Editorial:* Updated authors list
* From multiple individuals: marked last sentence as “Editor’s note”. “Balance the impact mean “that improvements should not come at the expense of legacy devices and if there is an impact – the feature should have reasonable handles to control it. More details will follow once we pass more SPs/motions and that sentence will naturally be gone
* from Alfred – “mechanism” -> channel access protocol”
* Xiaofei Wang – changed tail access delay to worst case access latency; deleted “Details TBD”; “aims at reducing” -. “reduces”
* From Mark Rison: “low latency traffic buffered…” -> low latency AC\_VO traffic
 |
| 2 | Editorials:* From multiple individuals: Added “TBD rules” to “balance the impact” sentence and removed Editor’s note; removed “expected” and replaced with “should” as not this sentence has “TBD rules”
* Yongho Seok: reverted worst -case to tail access delay latency;
* From Mark Rison: reverted “protocol “ to “mechanism”
* From Minyoung: Moved other cases are TBD into parenthesis to explicitly connect to AC\_VO traffic
* Added SP text
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| 3 | Editorials:* From multiple individuals: modified “tail access delay” to “the access delay distribution tail”
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| 4 | Technical: * Merged and approved all previously received comments as motioned in Motion 211[2]
* Added SP2/Motion 272 text approved in Jan IEEE meeting
* Added text corresponding to Motion 272
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| 5 | Technical: * Added text related to Motions 339, 340 and 341

Editorials:* Multiple changes
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# Introduction

Interpretation of a Motion to Adopt

A motion to approve this submission means that the editing instructions and any changed or added material are actioned in the TGbn Draft. The abstract, revision information, introduction, explanation of the proposed changes and references sections are not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGbn Draft (i.e., they are instructions to the 802.11 editor on how to merge the text with the baseline documents).***

## Explanation of the proposed changes:

The proposed changes to the 802.11 TGbn draft within this document are based on the following motions adopted by the TGbn task group:

### Relevant passed motions:

[Motion 123, [1] doc #11-24/0171r19 ,SP2 – Channel Access, doc 11-24/1667r13]

**Do you agree to improve EDCA to reduce tail access delay of Low Latency traffic in multi-BSS dense scenarios in presence of best effort traffic?**

* The solution to improve EDCA is distributed
* The impact on legacy device has to be balanced
* Low Latency traffic is treated as AC\_VO traffic. Other cases are TBD

[Motion 272, [2] doc #11-25-0014r7, SP – Channel Access: doc 11-24/2074r18

**Do you agree to define PEDCA in UHR where a STA with Low Latency traffic may be allowed, based on TBD conditions, to send a Defer Signal (it is TBD whether RTS or CTS frame is used) to start a protected short contention for pending LL data**

* Conditions to be allowed to send a Defer Signal is TBD
* STA in PEDCA always use RTS/CTS as initial frame exchange and retry.
* Duration of protected short contention is TBD.
* Access parameters (AIFSN, CW and the expansion rules) used to transmit the Defer Signal are TBD.
* The retry count where the Defer Signal is allowed to be sent is TBD
* Contention parameters for the protected short contention are TBD. The STAs that transmitted a Defer Signal but did not win the protected short contention will initiate a new retry.
* Low Latency traffic is treated as AC\_VO traffic. Other cases are TBD.
* The solution would provide control on the degree of collisions that may occur while using it and, allows for autonomous randomness or/and controlled by the AP
* No new mandatory synchronization requirement on STA side
* HIP EDCA is used by the STA in a BSS only when this feature is enabled by the AP

[Motion 339, [3] doc #11-25-0014r13, SP – Channel Access: doc 11-24/0221r10

11bn defines CTS as Defer Signal to start protected short contention for the pending LL data

[Motion 340, [3] doc #11-25-0014r13, SP – Channel Access: doc 11-24/0221r10

* TGbn defines the reference value for the Protected Duration of the protected short contention
	+ The default value is equal to AIFSN[2] + 7 slots (97 us)
	+ The Defer Signal frame carry that Protected Duration in the Duration field
	+ UHR AP may advertise values other than default

[Motion 341, [3] doc #11-25-0014r13, SP – Channel Access: doc 11-24/0221r10

* Define default parameters for P-EDCA for AC\_VO to be used during protected short contention period as follows:
	+ P-EDCA CWmin=7, P-EDCA CWmax=7
	+ P-EDCA AIFSN=2
	+ An UHR AP may advertise values other than default

# Text to be adopted begins here:

* UHR Capabilities element
* General
* UHR MAC Capabilities Information field

***TGbn editor: Please update UHR MAC Capabilities in 11bn D0.1 to add P-EDCA Support field as below***

The format of the UHR MAC Capabilities Information field is defined in Figure 9-aa5 (UHR MAC Capabilities Information field format).

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | B0 | B1 | B2 | B4 | B5 | B6 | B7 | B8 Bx |
|  | DPS Support | DPS Assisting Support | Multi-Link Power Management | NPCA Supported | BSR Enhancement Support | DBE Support | P-EDCA Support | Reserved |
| Bits: | 1 | 1 | 1 | 1 | 1 | 1 | 1 | x-8 |
| * UHR MAC Capabilities Information field format
 |

|  |
| --- |
| * Subfields of the UHR MAC Capabilities Information field (continued)
 |
| Subfield | Definition | Encoding |
| … | … | … |
| P-EDCA Support | Indicates whether or not P-EDCA is supported | Set to 1 if dot11PEDCAOptionImplemented is true (see 37.2 (Prioritized EDCA)).Set to 0 otherwise. |

***TGbn editor: please make changes to the following subclause:***

37.2 Prioritized EDCA[#M123]

Prioritized EDCA (P-EDCA) is an enhancement of the EDCA mechanism (see 10.23.2 (HCF contention based channel access (EDCA)) that reduces the access delay distribution tail for low latency AC\_VO traffic (other cases are TBD). The use of P-EDCA by a UHR STA should balance the impact on STAs that do not use P-EDCA with TBD rules.

A STA that has dot11PEDCAOptionImplemented set to true is called P-EDCA eligible STA and shall set P-EDCA Supported field of the UHR MAC Capabilities Information field of UHR Capabilities element to 1.

A P-EDCA eligible STA may start a P-EDCA contention if all the following conditions are satisfied:

* P-EDCA is enabled by the AP in the BSS
* The P-EDCA eligible STA has AC\_VO buffered traffic
* Other TBD conditions

The exact enablement mechanism is TBD.

To start a P-EDCA contention a P-EDCA eligible STA shall transmit [#339] a CTS frame. The transmission of the [#339]CTS frame shall occur at the TBD slot boundary if the STA’s CS mechanism (see 10.3.2.1 (CS mechanism)) determines that the medium is idle. For the purposes of this clause, the frame that start the P-EDCA contention is called a DS-CTS frame.

The [#339] DS-CTS frame shall be transmitted in a non-HT or non-HT duplicate PPDU and using ~~TBD~~ 6 Mb/s data rate. The RA field of the CTS frame shall be set TBD value and the Duration field shall be set to the value of the P-EDCA contention duration from the Table 37-1.

P-EDCA contention shall start immediately after the end of the transmitted [#339] DS-CTS frame and shall follow the random backoff procedure defined in 10.23.2.4 (Obtaining an EDCA TXOP) except that:

* Only EDCAF[VO] shall be allowed to contend during the P-EDCA contention
* [#341] The EDCAF[VO] shall initialize the AIFSN, CWmin, and CWmax with the values of P-EDCA AIFSN, P-EDCA CWmin, and P-EDCA CWmax respectively. CW[VO] shall be initialized to CWmin[VO].
* At the start of the P-EDCA contention, the EDCAF[VO] set thebackoff counter to an integer value chosen randomly with a uniform distribution taking values in the range 0 to CW[VO]

Table 37-1 Default P-EDCA parameter set defines the default P-EDCA parameters used by a STA for P-EDCA contention. A P-EDCA eligible STA shall update the P-EDCA parameter set to the most recent P-EDCA parameter set advertised within BSS.

**Table 37-1 — [#M341] Default P-EDCA parameter set**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | P-EDCA CWmin | P-EDCA CWmax | P-EDCA AIFSN | P-EDCA contention duration |
|  | 7 | 7 | 2 | 97 µs |
| Note: The NAV set by the Duration field of the DS-CTS frame protects the medium for the maximum P-EDCA contention duration: SIFS + (pEdcaAifsn + pEdcaCwMax) \* aSlotTime. Hence, the default values relate as follows: 97 µs = 16 µs + 2\*9 µs + 7\*9 µs |

A P-EDCA eligible STA that initiates a TXOP (see 10.23.2.4) during a P-EDCA contention shall transmit an RTS frame as the initial frame in the TXOP.

A P-EDCA eligible STA that successfully (as defined in 10.23.2.2 EDCA Backoff procedure) delivered one or more pending MPDUs in a TXOP obtained using P-EDCA contention shall not use the P-EDCA mechanism until TBD conditions are satisfied and EDCAF[VO] shall update the AIFSN, CWmin, and CWmax with the values in dot11EDCATable.

A P-EDCA eligible STA that did not initiate a TXOP (see 10.23.2.4) during P-EDCA contention or did not receive a CTS frame in response to the RTS frame used to initiate the TXOP obtained during P-EDCA contention may transmit [#339] a DS-CTS frame without invoking the backoff procedure as in 10.23.2.4 to start another P-EDCA contention, for up to TBD retries. If the STA reaches TBD retry limit, it shall not attempt to start P-EDCA contention until TBD conditions are satisfied and the EDCAF[VO] shall update the AIFSN, CWmin, and CWmax with the values in dot11EDCATable.

# Text to be adopted ends here.

**SP: Do you agree** **to incorporate the proposed text changes for P-EDCA in 11-24/2007r6 to the latest TGbn draft?**

**References:**

1. [11-24-0171r21](https://mentor.ieee.org/802.11/dcn/24/11-24-0171-21-00bn-tgbn-motions-list-part-1.pptx): 11-24-0171-21-00bn-tgbn-motions-list-part-1, Alfred Asterjadhi (Qualcomm Inc.)
2. [11-25-0014-r7](https://mentor.ieee.org/802.11/dcn/25/11-25-0014-07-00bn-tgbn-motions-list-part-2.pptx): 11-25-0014-07-00bn-tgbn-motions-list-part-2, Alfred Asterjadhi (Qualcomm Inc.)
3. [11-25-0014-r](https://mentor.ieee.org/802.11/dcn/25/11-25-0014-013-00bn-tgbn-motions-list-part-2.pptx)13: 11-25-0014-013-00bn-tgbn-motions-list-part-2, Alfred Asterjadhi (Qualcomm Inc.)